R E M A R K S

Applicant has carefully considered the above identified Office Action, and in response thereto is addressing each issue raised by the examiner in the remarks hereinbelow. Applicant is amending claims 1, 17 and 31; and adding claims 36 - 38.

Claim Rejections 35 USC 103

Applicant has amended claims 1, 17 and 31 by adding the phrase, "said wrap spring clutch initiating rotation of said lead screw and stopping rotation of said lead screw." However, applicant respectfully disagrees with examiner's rejection of claims 1 and 17 using Derlien, Herold et al., Figueira et al. and Osawa in further view of Wegmann et al. and D'Antonio et al. Applicant also respectfully disagrees with examiner's rejection of claim 31 using Derlien, Herold et al., Figueira et al. and Osawa in further view of Wegmann et al. and D'Antonio et al. and in further view of Keller.

According to MPEP 2143 there are three requirements to establish a case of obviousness:

> 1) There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings.
>
> 2) There must be a reasonable expectation of success.
>
> 3) The prior art reference must teach or suggest all claim limitations.

Applicant argues that requirement #3 of MPEP 2143 is not met by any prior art reference cited by the examiner.

I. The Wrap Spring Clutch: (Claims 1, 17, 31)

Argument #1

Applicant's claim 1 reads, "a wrap spring clutch capable of coupling the rotation of said flywheel with said lead screw to drive said slide platform..." Thus, applicant's system contains a rotating flywheel, and our clutch couples the rotation of the rotating flywheel to a lead screw to DRIVE the slide platform. Initially the flywheel is spinning at a constant rate, applicant's wrap spring clutch is disengaged, the lead screw and slide platform are at rest. Upon engagement, the clutch couples the spinning flywheel with the lead screw and CAUSES the platform to move. Engagement of our clutch thereby causes, initiates, and maintains the movement of the slide platform, much as a clutch used in an automobile. The automobile from rest to motion when the clutch is engaged.

Though some of the prior art references presented by the examiner contain clutches, none of their clutches has the purpose of causing, or initiating, or maintaining, or driving the movement of the apparatus. Instead, the clutched systems that the examiner presents effectively leave the clutch engaged, and cause, initiate, maintain, and drive movement of their syringe pumps by some other means, for example by switching the power on and off. Their clutches serve entirely different roles than applicant's clutch.

For instance, Herold et al. teaches a motor and a magnetic clutch activated by the same switch, so that the magnetic clutch is engaged when the motor is on, and disengaged when the motor is

off. The purpose of the Herold et al. magnetic clutch is not to drive their syringes, their syringes could be driven just as readily in the absence of their clutch. Rather, the purpose of Herold et al. clutch is SOLELY to DISENGAGE the lead screw from the motor, so as TO ENABLE MANUAL REVERSAL of the lead screw when the motor is OFF. The Herold et al. abstract states, "When motor is switched off and the clutch disengaged, the pistons 15, 16 may be manually retracted and re-advanced by means of a handwheel 33."

As another example, the system of Derlien, which forms the central basis of the examiner's arguments, teaches a spring-activated clutch, which disengages the lead screw from the motor whenever the back pressure of the syringes exceeds the tension of the spring. Derlien's clutch is not purposed to drive the syringes, which could be driven just as effectively were the clutch absent. Rather, Derlien's clutch acts as a backpressure-relief, safety clutch, which disengages to prevent breakage of plugged syringes. When Derlien's clutch disengages mechanically (due to plugging of the syringes), the lead screw ceases to rotate, and that cessation of rotation is noted by a rotation detector. The rotation detector then signals a processor to interrupt power to the motor, which shuts off the pump.

The purpose of Derlien's clutch is NOT to engage the motor to the lead screw, but to DISENGAGE the motor from the lead screw. To replace the spring clutch of Derlien "with a magnetic clutch and flywheel assembly such that one may more easily control the coupling and decoupling of the clutch using electrical signals from

the processor 60 of Derlien" (office action page 3, paragraph 2), as the examiner recommends, and as the examiner suggests has been done by us, and as he suggests would be done by one skilled in the art, would completely obviate the purpose for which Derlien uses his clutch, and would destroy the function of his design, because Derlien's clutch is a back-pressure relief clutch, and is NOT included to DRIVE his pump. Note also that Derlien's system is not a processor-controlled clutch as our wrap spring clutch is, rather Derlien's is a clutch controlled processor.

The system of Keller does not really have a clutch, but instead employs a motor and a gearbox. Their electrically shifted gearbox enables selection of forward and reverse rotation of the lead screw.

Argument #2

One purpose of applicant's wrap spring clutch is to cause, initiate, maintain, and to drive the movement of the slide platform. An additional purpose of the wrap spring clutch is to stop a moving slide platform, and to hold it stationary. The Warner Electric CB-2 clutch is named "C" for "Clutch", and "B" for "Brake". It is a clutch-BRAKE. The number "2" designates the clutch's size; it is a small clutch. The CB-2 contains two springs, each wrapped in the opposite direction around the shafts. One spring is called a START spring (engagement spring), and the oppositely wound spring is called a STOP spring. Because each spring serves as a clutch, applicant's wrap spring clutch is in reality, two clutches in one device. As stated in Point #1 above,

no prior clutched syringe pump that the examiner presents engages its clutch to initiate movement of its load.

Additionally, no prior system that the examiner presents includes two clutches. Only applicant has a dual clutch design. None of the prior art references cited by the examiner ENGAGES a clutch or applies a brake to stop its load. Applicant's wrap spring clutch design is two clutches in one device. The wrap spring clutch disengages its stop spring and engages its start spring to move its load. And the wrap spring clutch disengages its start spring, and engages its stop spring to stop and to hold its load from moving.

Argument #3

As stated in Argument #1, the wrap spring clutch is able to start and to maintain movement of its load. As stated in Argument #2, the wrap spring clutch is able to stop its load, and to hold its load stationary. It is able to accomplish these things by having two clutches (two oppositely wound wrap springs), one wrap spring to start the load, the second wrap spring to stop the load. Additionally, the wrap spring clutch is able to coordinate the respective engagements and disengagements of its start spring and its stop spring with a single control collar controlled electrically by a single solenoid. Both clutches within the wrap spring clutch are controlled by a single means.

Additionally, whenever the start spring is engaged, and the stop spring is disengaged the wrap spring clutch and its control collar spin, spinning together with both the flywheel and the lead

screw. Thus, with a two-stop control collar (see specification for an explanation of a two-stop collar), the control collar spins exactly 1/2 rotation between engagement and disengagement of the start spring, and the same control collar spins exactly the same 1/2 rotation between disengagement and re-engagement of the stop spring, all while the clutch is spinning and stopping together with the lead screw. The lead screw only spins whenever the start spring is engaged, and the stop spring is disengaged; and when the lead screw spins, it spins at the same rotational velocity as the flywheel. The lead screw is held motionless whenever the stop spring is engaged, and the start spring is disengaged.

The above characteristics mean that pushes of the syringe ram have the same duration and distance of push of exactly 1/2 rotation of the lead screw, with a 2-stop collar. If the lead screw is machined with a uniform pitch, then every start-push-stop of a wrap spring clutch syringe ram is of exactly the same duration and distance, for a given, constant rotational velocity of the flywheel. The engagement of the start spring is always positive, and always requires 3 msec, and always is reproducible at the start of each push; the stopping of each push by engagement of the stop spring is always positive, always is of 1.5 msec duration, and also is reproducible.

I am aware of no other system anywhere which enables such exact coordination between a start clutch and a stop clutch (brake), and such exact reproducibility of the duration the intervening push. No system of prior art presented by the examiner

in his Office Action teaches two clutches whose respective engagement and disengagement are precisely, positively, and reproducily coordinated by a single means. Such properties are inherent in the definition of the wrap spring clutch as defined in the claims.

II. The Cam: (Claims 17, 31)

Examiner interprets the use of the word "cam" by Keller in his claim 3 to be equivalent to "cam" in our application. Keller's cam is located somewhere in their gearbox in association with a sliding sleeve, in a manner which is not completely clear. However, Keller's cam appears to be a protrusion which fits into a notch on a gear, thereby enabling selective engagement of the notched belt drive of their motor with their lead screw, to shift between forward and reverse rotation of said lead screw. The cams recited in claims 17 and 31 are not components of a gear box, neither are they involved in shifting within a gearbox, but the cams are used to push the syringe plungers either directly via cam followers, or via a platform which the cam/cam-follower system pushes. Thus, though the word "cam" is used by both Keller and applicant for different purposes.

Examiner has not meet his burden of providing prior art that teaches all the claim limitations of claims 1, 17 and 31 as required by item #3 of to MPEP 2143. Therefore, claims 1, 17 and 31 are allowable and all claims dependent upon the above claims.

C O N C L U S I O N

It is respectfully submitted that applicant has responded in a fully satisfactory manner to all matters at issue in this application, and this application is now in condition for allowance. In this regard, applicant has made every effort to comply with the requirements set forth in this Office Action as well as statutory requirements. Accordingly, applicant respectfully requests that the Examiner enter this amendment, allow the claims, and pass this application on to issue.

Respectfully submitted,

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